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of Response

DUE ON APR 20 2011

Application No. : 2,507,428
Owner : NIIGATA TLO CORPORATION
Title : HYDROGEN GAS SENSOR
Classification : G01N 27/26 (2006.01)
Your File No. : 3314-532CA KMP/ch
Examiner : Tung Nguyen 18491-10A JP

YOU ARE HEREBY NOTIFIED OF A REQUISITION BY THE EXAMINER IN ACCORDANCE WITH SUBSECTION 30(2) OF THE *PATENT RULES*. IN ORDER TO AVOID ABANDONMENT UNDER PARAGRAPH 73(1)(a) OF THE *PATENT ACT*, A WRITTEN REPLY MUST BE RECEIVED WITHIN 6 MONTHS AFTER THE ABOVE DATE.

This application has been examined taking into account applicant's correspondence received in this office on November 19, 2009.

The number of claims in this application is 18.

The further search of the prior art has revealed the following:

References Applied: (The search was performed taking into account the office actions from the United States Patent Office)

United States Patents and Applications

D1 - 20020070109 □	Jun. 13, 2002	U.S. Cl. 204/426	Taniguchi
D2 - 6656336 □	Dec. 2, 2003	U.S. Cl. 204/424	Mukundan et al.
D3 - 4704536 □	Nov. 3, 1987	U.S. Cl. 250/381	Sugiyama et al.
D5 - 4390869 □	Jun. 28, 1983	U.S. Cl. 340/632	Christen et al.
D6 - 20040026268 □	Feb. 12, 2004	U.S. Cl. 205/784	Maki et al.
D7 - 20020000228 □	Jan. 3, 2002	U.S. Cl. 128/204	Schoeb

PCT Application

D4 - 0189021 □	Nov. 22, 2001	H01M 10/40	Yun et al.
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□ citation stemming from a foreign search report

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D1 discloses a hydrocarbon sensor comprising a substrate made of a solid electrolyte that conducts protons.

D2 discloses solid state hydrocarbon sensors having metal and metal oxide electrodes.

D3 discloses a gas sensor and a method for detecting a small amount of a gas such as CO contained in air entering a space between electrodes ionized by a radiation source.

D4 discloses a composite polymer electrolyte comprising a polymer electrolyte matrix in the form of super fine fibers.

D5 discloses a gas sensing signaling system comprising a plurality of gas sensing units connected over cables with a central station.

D6 discloses a gas sensor and a method of sensing the gas concentrations.

D7 discloses a gas forwarding apparatus for respiration and narcosis devices.

The examiner has identified the following defects in the application:

Correspondence

It was argued in the correspondence dated November 19, 2009 that the claims are novel because:

"the gas sensor of D1 does not contain electrolyte in the first embodiment and the second embodiment because the membrane 1 is interspersed between the deposited platinum catalysts 5 formed on both surfaces of the membrane 1", "the palladium layer 42 and the platinum layer 44 of D1 do not correspond to the different material of higher chemical potential for hydrogen gas as taught in the present claimed invention", and "D2 does not use the electromotive force between the first electrode and the second electrode formed at the surfaces of the electrolyte, respectively, as defined in the present claimed invention"

A secondary search was performed and documents D1 to D7 was found to be pertinent to the claims.

Novelty

Claims 1-5 and 8 do not comply with paragraph 28.2(1)(b) of the *Patent Act*. D1 disclosed the claimed subject matter before the claim date.

Regarding claim 1, D1 teaches a hydrocarbon sensor with a substrate and a solid electrolyte with two electrodes (page 2 [0035]; page 3 [0037]; figure 1B). The first electrode (12a) is made from "a paste containing Au particles and Al particles" which is baked, "forming the electrode containing Au and Al" (page 2 [0018]). The other electrode (12b) can be "made of Pt" (page 3 [0040]). These two electrodes, with their correspondingly different compositions, inherently differ in chemical potential for hydrogen gas.

Regarding claims 2-4, D1 teaches a hydrocarbon sensor with a substrate and a solid electrolyte with two electrodes (page 2 [0035]; page 3 [0037]), the first electrode being made from "a paste containing Au particles and Al particles" which is baked, "forming the electrode containing Au and Al" (page 2 [0018]). The other electrode can be "made of Pt" (page 3 [0040]). These two electrodes, with their correspondingly different compositions which inherently exhibit the standard electromotive forces required in claim 2.

Regarding claim 5, D1 (figure 1B) discloses two electrodes (12a and 12b) which are placed in a planar sandwich configuration around the electrolyte (11). This planar configuration reads on the claimed "plate", and the sandwich configuration reads on the placement of the electrolyte between the electrodes.

Regarding claim 8, D1 teaches a solid electrolyte (page 2 [0035]).

D1 described the features presented in claims 1-5 and 8 of the current application. Therefore, these claims are not novel in view of D1.

Obviousness

Claim 6 does not comply with section 28.3 of the *Patent Act*. The subject matter of this claim would have been obvious on the claim date to a person skilled in the art or science to which it pertains having regard to D1, in view of D2.

Regarding claim 6, D1 discloses a gas sensor with two electrodes with different chemical potentials for hydrogen gas. D1 does not appear to expressly disclose that the electrodes may be arranged as rods on a substrate with an electrolyte disposed in between. However, D2 discloses a hydrocarbon sensor in which two electrodes 12 and 16 are disposed on an electrolyte 10 (figure 1B). Electrode 16 is obvious in the shape of a rod. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the electrodes of D1 to be rods as those of D2 because the positioning of the electrodes yields no significant functional difference and are therefore are a matter of obvious engineering choice. Although only one electrode in D2 is actually shaped like a rod, one of ordinary skill in the art would not have difficulty discerning that electrode 12 could be fashioned in the same way.

Claim 7 does not comply with section 28.3 of the *Patent Act*. The subject matter of this claim would have been obvious on the claim date to a person skilled in the art or science to which it pertains having regard to D1, in view of D3.

Regarding claim 7, D1 discloses a gas sensor with two electrodes with different chemical potentials for hydrogen gas with an electrolyte disposed in between. D1 does not appear to expressly disclose that the electrodes may be arranged as concentric cylinders. However, D3 discloses a gas sensor with two co-axial electrodes 23 and 24 configured as concentric cylinders (figure 9). At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the gas sensor configuration of D1 with the concentric, cylindrical electrodes in D3 because the positioning of the electrodes yields no significant functional difference, and therefore concentric cylindrical electrodes are a matter of an obvious engineering choice.

Claim 9 does not comply with section 28.3 of the *Patent Act*. The subject matter of this claim would have been obvious on the claim date to a person skilled in the art or science to which it pertains having regard to D1, in view of D4.

Regarding claim 9, D1 does not appear to expressly disclose the electrolyte comprise an internal scaffold of a material such as glass wool. However, D4 discloses an electrolyte in which contains an electrospun matrix of polymeric, electrolytic material into which lithium salt-dissolved organic electrolytes are incorporated (abstract). One of the advantages of this construction as outlined by D4 is a "good mechanical strength". At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the electrolyte of D1 with an internal matrix like D4 because one would wish to take advantage of the improved mechanical strength such a construction would offer.

Claims 10-15 do not comply with section 28.3 of the *Patent Act*. The subject matter of these claims would have been obvious on the claim date to a person skilled in the art or science to which they pertain having regard to D1, in view of D5.

Regarding claims 10-12, D1 does not expressly teach that a voltage comparator be used in the apparatus. However, D5 teaches a gas sensing signaling system. In particular, D5 teaches having three comparators 101/1, 101/2, 101/3 (figure 7). These are voltage comparators (col. 12, lines 21-33). At the time of the invention, it would have been obvious to one of ordinary skill in the art to include a voltage comparator like that from D5 to the apparatus of D1 because of the necessary advantages of doing so, such as eliminating false alarms or alarms for negligible concentrations of gas.

Regarding claims 13-15, D1 does not expressly teach that a voltage comparator be used in the apparatus, nor does D1 teach the use of a Schmitt trigger. However, D5 teaches a gas sensing signaling system. In particular, D5 teaches having three comparators 101/1, 101/2, 101/3 (figure 7). These are voltage comparators (col. 12, lines 21-33).

Further, D5 teaches the use of Schmitt triggers to distinguish between warning signals and alarm signals (col. 15, lines 32-43). At the time of the invention, it would have been obvious to one of ordinary skill in the art to include a voltage comparator and Schmitt trigger like that from D5 to the apparatus of D1 because of the necessary advantages of doing so, such as eliminating false alarms or alarms for negligible concentrations of gas.

Claims 16 and 17 do not comply with section 28.3 of the *Patent Act*. The subject matter of these claims would have been obvious on the claim date to a person skilled in the art or science to which they pertain having regard to D1, in view of D6.

Regarding claim 16, D1 does not expressly teach that there be a plurality of hydrogen gas sensors arranged on the same substrate. However, D6 teaches an apparatus which is an electroactive force type gas sensor comprising a substrate and a gas sensor on that substrate (claim 1). Further, D6 teaches an electroactive force gas sensor with two or more electroactive force gas sensors on the same substrate (claim 7). At the time of the invention, it would have been obvious to those of ordinary skill in the art to provide a plurality of gas sensors like in D1 on the same substrate like in D6 because of the versatility such a configuration would have, such as the ability to allow for failure of some gas sensors without failure of the whole apparatus as well as the ability to possibly discern a target gas profile or concentration gradient.

Regarding claim 17, D1 does not expressly teach an electric circuit be provided. However, D6 teaches an apparatus which is an electromotive force type gas sensor comprising a substrate and a gas sensor on that substrate (claim 1). Further, D6 teaches a power supply circuit be present on the substrate, which reads on the electric circuit (page 9 [0110]). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the power supply circuit of D6 to the device of D1 because one would wish to process the signals output from the electrodes.

Claim 18 does not comply with section 28.3 of the *Patent Act*. The subject matter of this claim would have been obvious on the claim date to a person skilled in the art or science to which it pertains having regard to D1, in view of D7.

Regarding claim 18, D1 does not expressly teach that the gas sensor comprise a photo sensor or an LED. However, D7 teaches a gas forwarding apparatus which contains a gas sensor portion for determining a gas composition (figure 8). As described on page 3 ([0038]), a gas sensor 8 comprises a photo sensor portion 8b and a light source 8c. Light source 8c can be an LED. By applicant's own definition, the Fail-Safe function can be the detection of an LED by a photo sensor. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the LED/photo sensor arrangement of D7 to the device of D1 because the LED/photo sensor has been shown to be an acceptable means to convert a measured gas signal into an observable output.

Therefore, claims 6, 7 and 9-18 are obvious to D1, in view of D2 to D7.

Indefiniteness**Claims**

Claim 9 is indefinite and does not comply with subsection 27(4) of the *Patent Act*. The term "such as" renders the claim indefinite because it is unclear whether the limitations following the term are part of the claimed invention.

Claims 13-15 are indefinite and do not comply with subsection 27(4) of the *Patent Act*. The term "Shumitt inverter" should be replaced with "Schmitt inverter".

In view of the foregoing defects, the applicant is requisitioned, under subsection 30(2) of the *Patent Rules*, to amend the application in order to comply with the *Patent Act* and the *Patent Rules* or to provide arguments as to why the application does comply.

Under section 34 of the *Patent Rules*, any amendment made in response to this requisition must be accompanied by a statement explaining the nature thereof, and how it corrects each of the above identified defects.

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